

KILLING COVID AT HOME

How to keep the COVID-19 virus out of your house and out of your life.

If you have successfully evaded infection from the COVID-19 virus so far, the objective is to keep it that way. This requires setting up the place you live as a GREEN ZONE.

A green zone is where zero contamination with the COVID corona virus is allowed. Any thing and any one entering the green zone, must be thoroughly disinfected before crossing its outer boundary. Inside the green zone, life can then be lived relatively free of worry and in the greatest possible safety.

Any object or person not having a known COVID-free history, which might have at any time been touched by an unknown person, or even been near an unknown person, must be isolated outside, and disinfected before entry. Anything which has contacted surfaces of the outside world, such as shoes, gloves, wheels, clothing, backpacks, purses, luggage – all could be cross-contaminated by such contact, and must be disinfected before entry.

COVID-19 Disinfection

All methods of killing COVID require a certain amount of time.

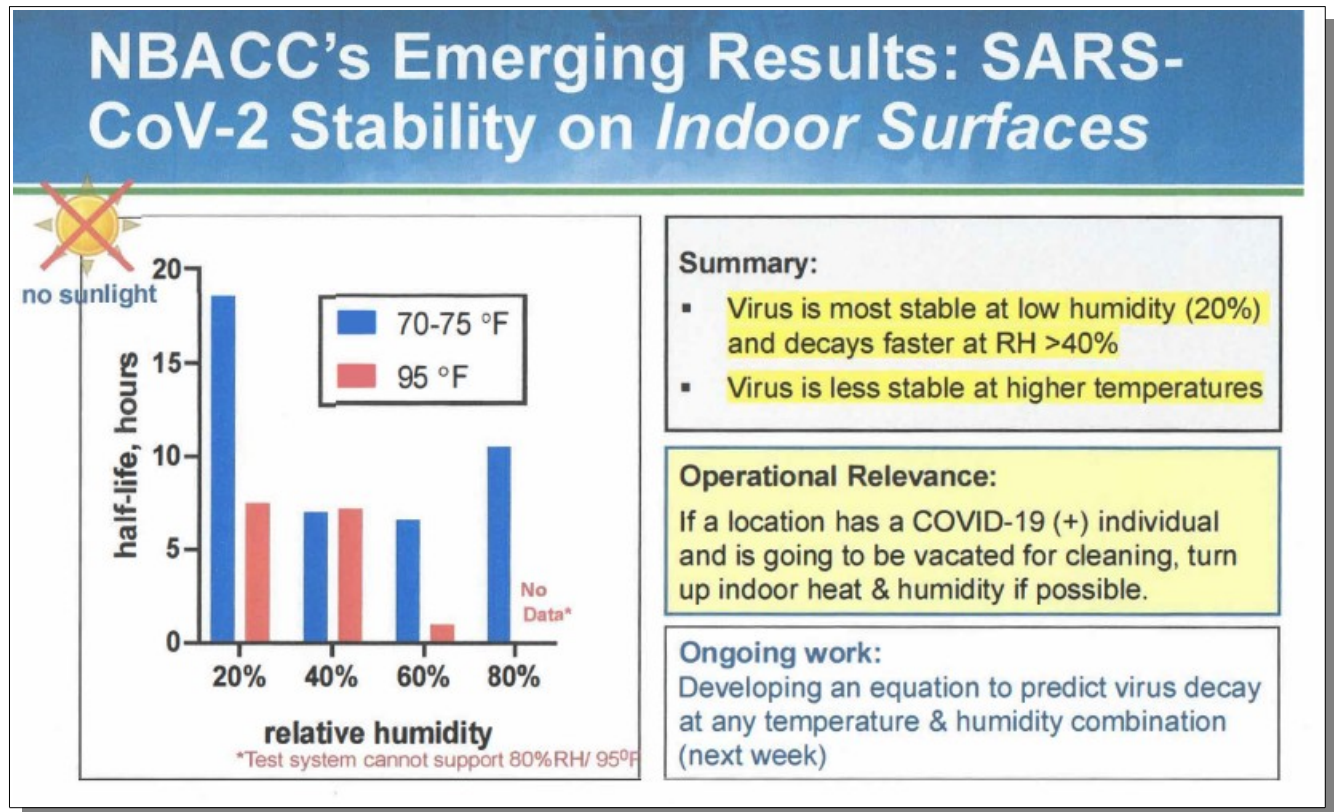
In the absence of a disinfecting agent, SARS-CoV-2, the virus that causes COVID-19 can live in the air and on surfaces between several hours and several days. A study found that the virus is viable for up to:

72 hours on plastics,
48 hours on stainless steel,
24 hours on cardboard, and
4 hours on copper.

It is also detectable in the air for three hours.

However, for safety it is recommended to NOT rely on time alone to destroy the virus.

All virus destruction times depend on temperature and humidity. Cold, dry, and dark conditions will cause the COVID virus to remain dangerous longer.



Fortunately, there are several methods you can use to greatly accelerate and assure destruction of the virus.

The main types of COVID-killing methods are:

- A) Chemical Disinfectants
- B) Heat (high dry heat)
- C) Heat combined with high humidity
- D) Ultraviolet Light

CHEMICAL DISINFECTANTS

1) CHLORINE DISINFECTANT

The cheapest, fastest, and most practical of all disinfectants, is chlorine. The simplest source of chlorine disinfectant is household chlorine bleach, or “pool shock” liquid chlorine for swimming pools. Make sure it lists “sodium hypochlorite” on the label.

Diluted household bleach solutions (Sodium Hypochlorite 5%–6% stated on label) can be used if tolerated by the item disinfected. Contact time must be at least 1 minute. Allow ventilation to avoid breathing chlorine fumes. If bleach is past expiration date, get fresh bleach if possible; and if not, use more per gallon. Never mix household bleach with ammonia or any other cleanser.

Prepare a bleach solution by mixing:

5 tablespoons (1/3rd cup) bleach per gallon of water, or

4 teaspoons bleach per quart of water

Bleach solutions will be effective for disinfection up to 24 hours, or longer if kept in cool and dark.

The solution will wet surfaces better if a small amount of plain liquid dish washing detergent is added. Do not use bar soap, laundry detergent, or dish detergent with additives for this.

Liquid pool shock chlorine solution (typically 10% Sodium Hypochlorite) can be used instead of household bleach.

Prepare a liquid pool shock solution by mixing:

2-1/2 tablespoons (1/4 cup) pool shock per gallon of water, or

2 teaspoons pool shock per quart of water

Ref: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cleaning-disinfection.html>

Chlorine solutions can be used to greatly help disinfect clothing and bed linens. Use an amount which will not fade colors more than what is acceptable, at least 1 cup per large load. For white fabrics, more can be used. In any case, your life and safety from COVID are probably worth more than bright colors.

*Per the Clorox Company - "Use 3/4 cup of **bleach** for a regular size load with an average soil level, and 1 ¼ cup for an extra-large or heavily soiled load. Using less than the recommended **amount** will not provide the correct **amount of bleach** active to **disinfect** the load. Don't overload the washer with too much laundry. Items need to circulate or tumble freely through the wash water for optimum cleaning."*

Pre-dilute the bleach with a quart of water and add slowly while the machine is agitating, or use the automatic bleach dispenser if it has one. This ensures even distribution. For more effect, pause the wash cycle after the bleach is thoroughly mixed in, giving the chlorine more time to work.

2) Quaternary Ammonium Disinfectants

Many disinfectants are sold which contain various quaternary ammonium compounds, such as benzalkonium chloride, etc.. These are not as corrosive as chlorine, and will not bleach color out of clothing. However, they are all **much slower than chlorine**, most requiring at least ten minutes of wet contact time to disinfect. They are also far more expensive than chlorine.

There are so many QADs that no guidelines can be given here, except follow label directions.

DRY HEAT

According to the World Health Organization, "[heat at 56°C \[132.8°F\] kills the SARS coronavirus](#) at around 10000 units [fold?] per 15 minutes."

More recent tests with SARS-CoV-2 in Hong Kong showed that it became undetectable after *just five minutes* at only 158°F (70°C). The time required to kill SARS-CoV-2 increased as the temperature was reduced, such that the time by which it was undetectable increased to 30 minutes at 132°F (56°C), two *days* at 98.6°F (37°C), and two *weeks* at 71.6°F (22°C). At 39°F (4°C) the virus remained detectable at two weeks when the experiment ended ([Chin, Lancet 2020](#)).

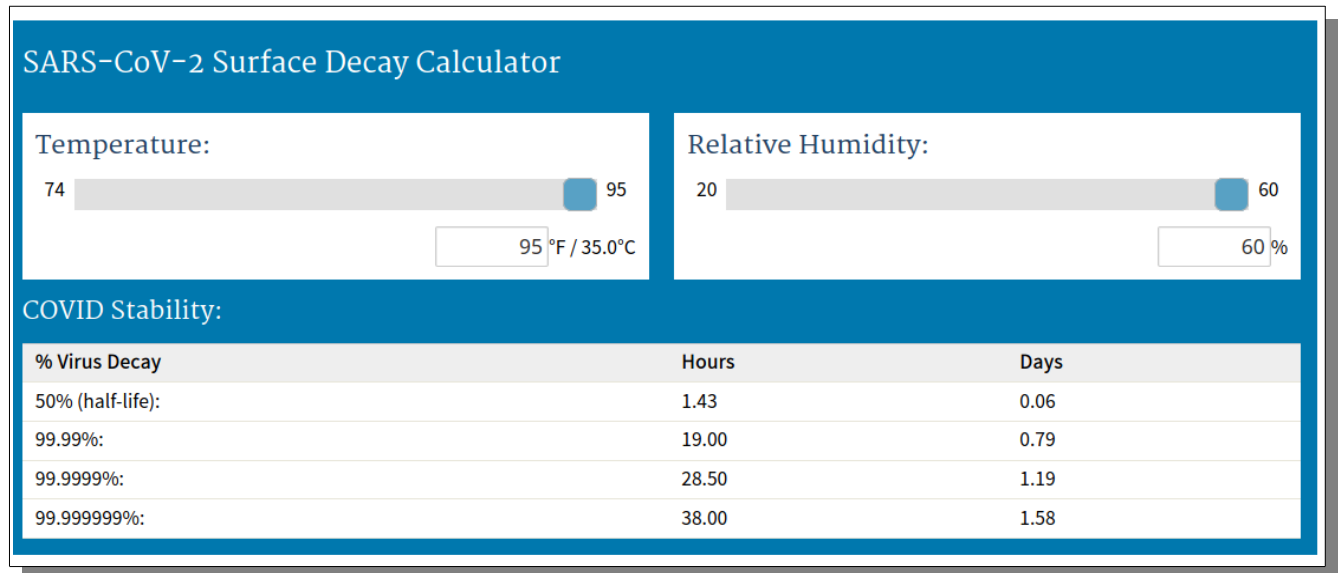
A cardboard box covered with a clear plastic trash bag, should easily maintain these temperatures for hours in warm weather under a bright sun. A cooking thermometer can be used to monitor inside box temperature. Leaving bagged items in a closed car under the sun can work much the same way.

WET HEAT

Humidity drastically increases the effectiveness of even moderate heat in killing COVID. To exploit this, inside any box used to keep items warm, a wet towel can be placed also.

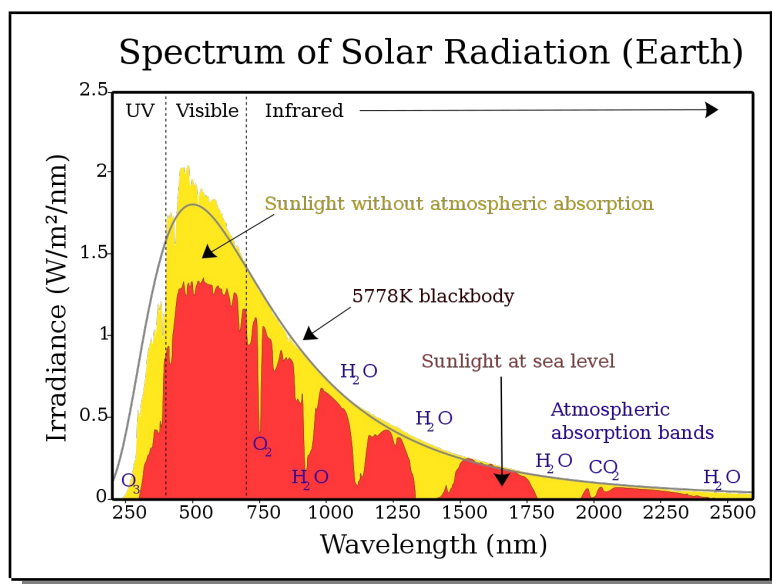
This will keep the inside very humid, to maximize the effect on damp proof items being disinfected. Of course, sunlight can be used to warm an enclosed “damp box.”

At even modest warmth of about 100 degrees Fahrenheit, such wetness will result in near complete death of COVID virus in about one day (see following chart).



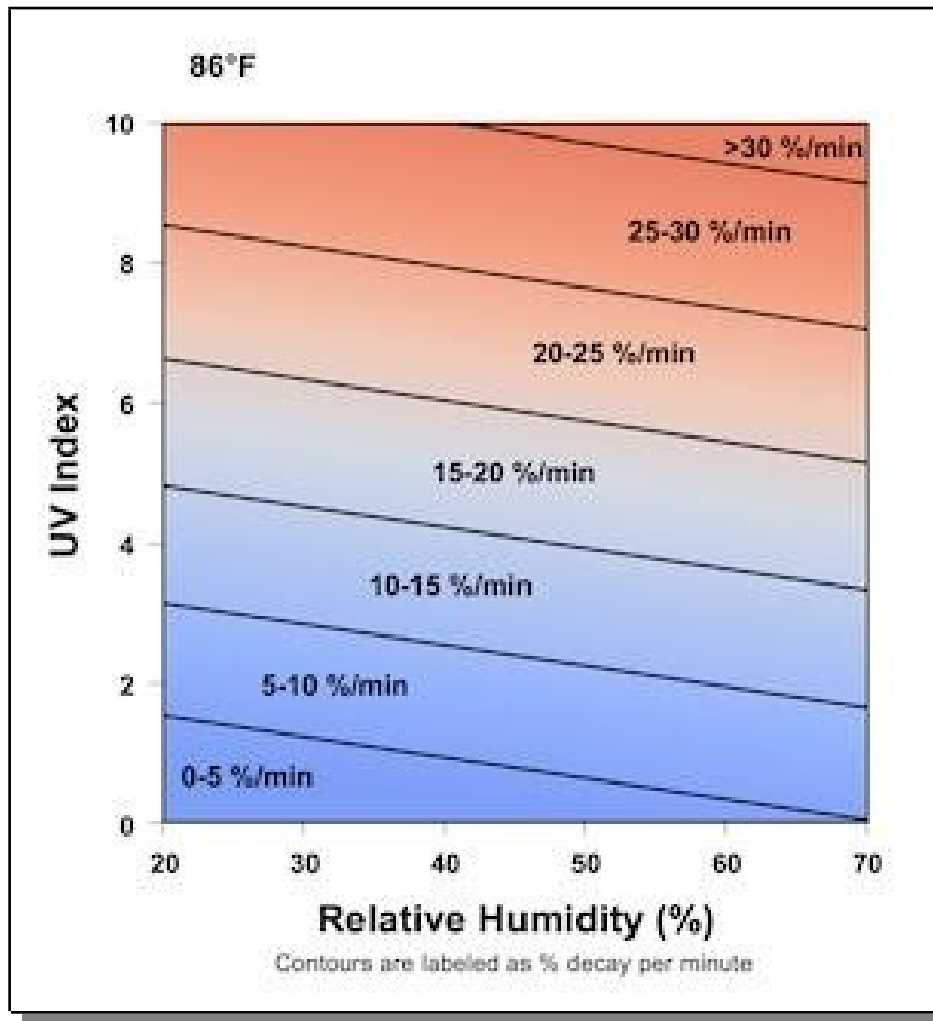
As we saw earlier, even in dry heat of 56 C (133 F), SARS-COVID is mostly killed in 15 minutes. At such elevated temperatures, wet heat and steam will be far more effective still. A dishwasher's final [rinse cycle is generally around 71.1°C](#) (160°F), at of course 100% humidity.

ULTRAVIOLET LIGHT - SUNLIGHT

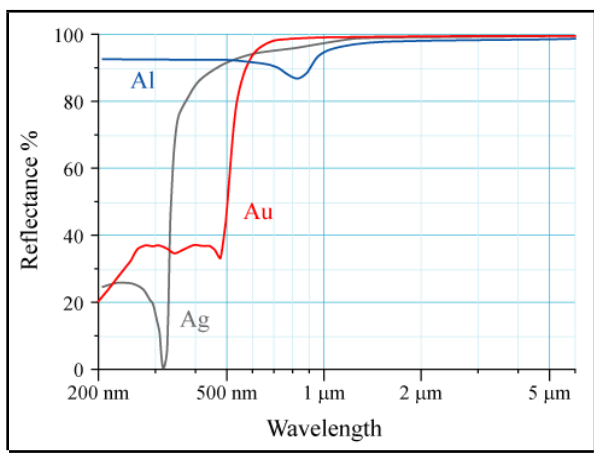


In clear weather, much of the ultraviolet light from the sun reaches the surface of the earth. In much the same way that it can cause a sunburn, sufficient UV light will damage the RNA and proteins of COVID virus to the point that it can no longer replicate.

Direct sunlight has been found to be very effective at killing COVID virus. Therefore in bright and sunny weather, **an unlimited amount of free disinfectant is available for us to use**. The predicted UV index, or intensity of solar UV light, can often be found in many weather forecasts. The higher the index, the faster COVID virus is destroyed.



In bright sun, about 30 minutes of direct exposure to every surface should be enough to assure that the outside of an object is COVID free (>99.95%).



Since aluminum foil is an excellent reflector of ultraviolet light, it can be used to concentrate available sunlight for faster and more effective use. A reflector can also ensure that all surfaces are more thoroughly radiated, requiring less turning of objects so that all sides face the sun. Cardboard boxes lined with aluminum foil are suitable for this.



Results:

Simulated sunlight greatly increases inactivation rate of virus dried on surfaces (relative to darkness)

Solar Intensity	Half-Live (Min)
Full Intensity	~2 min
Half Intensity	3 min
Quarter Intensity	4 min
No Light (Dark)	No decay > 60 min

Frame of Reference:

Full intensity = NYC/DC during clear day on summer solstice

Quarter Intensity = NYC/DC clear day end of February

- Sunlight reduced infectious virus to undetectable levels after just 3 minutes of exposure to the solar equivalent of midday sun on a sunny day in the middle latitudes of the US.



Summary:

- Simulated solar light rapidly inactivated the virus (outdoor)

Operational Relevance:

Outdoor surfaces exposed to sunlight are lower risk for virus transmission

Ongoing and planned work:

Repeat with a higher concentration of virus to better understand decay rate

What else needs to be known:

- How much virus does it take to infect?
- How much virus is on the surface?
- How much virus comes off when touched?

7

Objects placed in the sun (especially concentrated sun) will become hot. This heat will add to the effectiveness of COVID virus destruction.

COVID-19 Disinfection; Applications

GROCERIES

For an excellent detailed video on how to properly disinfect your groceries before they enter your green zone, see here; <https://archive.org/details/disinfecting-groceries>

PRODUCE

In addition to sanitizing food contact surfaces, chlorine bleach solutions may be used for sanitizing raw fruits and vegetables during the washing or peeling process.

Federal regulations permit the use of sodium hypochlorite (chlorine bleach) in washing produce (21 CFR Part 173). The rules state: 1) The concentration of sanitizer in the wash water must not exceed 2000 ppm hypochlorite, and 2) The produce must be rinsed with potable water following the chlorine treatment.

Reference: <https://ohioline.osu.edu/factsheet/aex-262>

Use *Regular* bleach (no additives, no thickeners, no perfume) with sodium hypochlorite as the active ingredient.

Today's "Regular" Clorox bleach is 'concentrated' at 8.25% sodium hypochlorite. For this, use

2 teaspoons Regular Bleach (8.25% sodium hypochlorite)
1 Gallon of clean water

This will result in a 200 ppm (parts per million) chlorine solution. Contact time should be at least ten minutes.

If you are using Regular bleach of 5 – 6.25% sodium hypochlorite (read the label), then use

1 Tablespoon Regular Bleach (5 - 6.25% sodium hypochlorite)
1 Gallon of clean water

This will result in a 200 ppm (parts per million) chlorine solution. Contact time should be at least ten minutes.

Note that the regulations allow for using up to TEN TIMES this amount of chlorine in the produce wash water. This means you can use the standard chlorine disinfectant solution described on page 3 for produce as well. In this case, the wet contact time can be reduced to at least one minute.

FAST FOOD or RESTAURANT TAKE-OUT

Even before COVID-19, restaurants were commonplace portals for transmission of disease, mainly influenza. Do not assume that standards have been made any tighter in the food preparation areas for COVID-19.

Take your own large container or large plastic bag when you go to buy the food. Slip the packaged food directly into your container – avoid touching it if possible. This will allow you to take it home safely. Disinfect your hands immediately if you had to touch the food packaging.

At home, open your outer container, then open the food packaging without touching the food inside. Immediately wash and disinfect your hands, before touching anything else. Now, with clean hands (or the hands of an assistant) remove the food itself,

without touching any packaging. The food is then placed on plates or on a metal rack. The food itself will next be disinfected with heat.

1) USING MICROWAVE OVEN

Cover the food on a plate, and microwave it long enough to get the food steaming hot – too hot to comfortably touch. Keep it at this temperature for at least 10 or 15 minutes by microwaving a few seconds more every two minutes, or by wrapping it with layers of towels to keep it hot. Make sure it is still steaming hot at the end. The lettuce and pickles will be wilted, but it should be safe.

2) USING A GAS OR ELECTRIC OVEN

Pre-heat the oven to 250 – 300 degrees F. With a toaster oven, use convection mode.

Put the food on rack or on heat resistant plate into the oven. Putting a pan with a little water under or alongside the food in the oven, will help keep food from drying out, and increase effectiveness. Leave the food in long enough to get the internal temperature steaming hot – too hot to comfortably touch. The internal temperature should be kept this way for at least 10-15 minutes. The total time will be longer, depending on the thickness and starting temperature of the food.

SHOES

When outside your green zone, on sidewalks or in stores etc., you may have walked through infectious material. Shoes can be removed, being careful not to touch the soles, and left by the entrance outside. Or, they can be sprayed with chlorine disinfectant and left for at least one minute. Some door mats (“astro-turf”) lend themselves to spraying with chlorine disinfectant, and the shoe soles shuffle-brushed with disinfectant. Don’t walk on expensive carpets until the soles are dry.

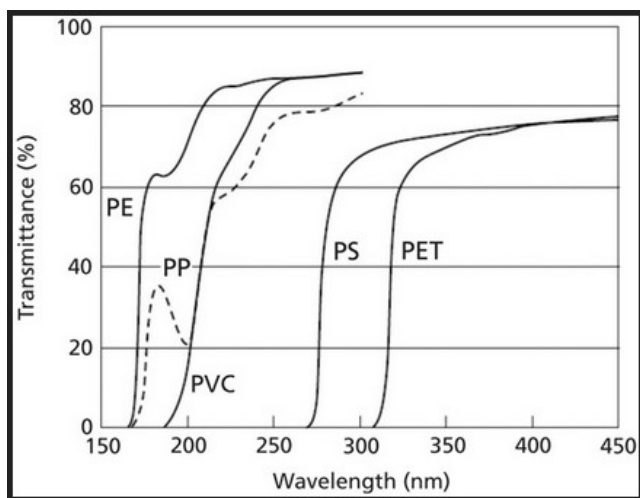
PURSES, BACKPACKS, ETC.

Anything that touches a surface outside the green zone, may become contaminated. They can be decontaminated with chlorine, but chlorine may ruin the color. If this must be avoided, use the solar-UV method described previously, or quaternary ammonium disinfectants with at least ten minutes wet time. Alternately, purses or backpacks etc. can be carried inside an outer plastic bag, which is then carefully stripped, disinfected, or discarded outside upon return to your green zone.

RE-USE OF MASKS

Masks made of ordinary fabrics most likely can be laundered with chlorine as described previously. Colored masks containing cotton may fade in color with chlorine. Most N-95 mask filtering materials are made from polypropylene. Polypropylene and other woven or non-woven fabrics should be able to withstand the heat and humidity treatment described previously. A sun-warmed “damp box” maintained at only 100 F temperature, should render masks inside 99.99% COVID virus free after two daytime periods.

Colored masks will probably not transmit UV light well, whatever they are made of.



Since they are porous, virus may be protected from UV within pores. However, N-95 masks made from colorless polypropylene (PP) should transmit UV light well enough to kill virus within the filter material (see left). A “damp box” heated by the sun, if enclosed in a typical polyethylene (PE) colorless plastic bag to let sunlight in, should also allow 90% of UV in also. This should increase effectiveness of the box for typical N-95 masks.

Help Support This Work

If you would like to help us help others in the fight against COVID-19 SARS-CoV-2, please feel free to donate;



Bitcoin Receiving Address —

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If you develop emergency warning signs for COVID-19 get medical attention immediately. Emergency warning signs include:

- Difficulty breathing or shortness of breath
- Persistent pain or pressure in the chest
- New confusion or inability to arouse
- Bluish lips or face